Chapter

The Role of the Dental Therapists and Oral Hygienists in the Immediate Response to Traumatic Dental Injuries

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Abstract

Dental Therapists and Oral Hygienists receive training in dental trauma in their curriculum. When they are in their workspace however, many are not confident enough to provide treatment for patients presenting with dental trauma in the oral health setting. As members of the dental team they play an important role in the management of patients who present with traumatic dental injuries. It is therefore important that guidelines are developed for them to understand the role they need to play when providing oral health treatment. The chapter will focus on the etiology of dental trauma to assist the oral health clinicians to prepare for a diagnosis. The classification of traumatic dental injuries will be explained. This will lead to the description of the classified injuries and their management. Clear guidelines and management for the patients will thereafter be provided. The prevention of traumatic dental injuries will also be discussed so that the treatment provided to the patients is improved.

Keywords: dental trauma, traumatic dental injuries, soft tissue injuries, dento-alveolar injuries, oro-facial injuries

1. Introduction

Dental Therapists and Oral Hygienists are members of the dental team and dental professions who receive training in Traumatic Dental Injuries (TDI). However, many are not confident enough to provide treatment for patients presenting with TDI in the oral health setting. They are the first in line of response to provide treatment before referring to dentists and dental specialists. Anecdotal evidence indicates that the inability to treat TDI could be due to the fact that at times dental health care team members are not able to determine the source of TDI [1–3]. Based on this it is important to develop guidelines that will assist dental professionals to manage patients who present with TDI. [1, 2] It has been indicated that there is a need for treatment guidelines when oral health professionals provide treatment for TDI such as avulsed teeth [2]. Providing treatment guidelines will aid in ensuring that oral health care is delivered efficiently and in the best care possible [2, 3].

The consequences of not determining the source of TDI could at times lead to a failure in referring patients for further management. Knowledge of the appropriate treatments and management of patient presenting with TDI can reduce stress and anxiety for both patients and the dental professionals [3]. Therefore, it is important to promote awareness and recent information among the dental professionals as well as groups at risk regarding prevention and emergency treatment modalities. Correct application of these techniques immediately after the traumatic injury should improve both short- and long-term outcomes [1].

2. Rationale

Qualified Dental Therapists and Oral Hygienists have to develop lifelong learning to ensure optimal care for each patient. Part of the lifelong learning entails the ability to manage patients who present with TDIs. It is therefore important that there are guidelines established to improve their oral health practice [2, 3].

Objectives for professional practice include the ability to identify and care for the needs of patients with health problems that affect their oral hygiene [4]. Dental trauma has an impact on the oral hygiene of the patient thus it is critical for Dental Therapists and Oral Hygienists to be able to manage patients who present with those conditions [4–6]. This will enable them to maintain competency in their daily practice, apply scientific advances from new research, and provide patient care that is evidence based.

Based on the brief rationale it is therefore important to develop the objectives indicated in the next section for this book chapter.

2.1 Objectives

The objectives of this article are to:

- Classify traumatic dental injuries that can be observed in an oral health setting
- Provide clinical management strategies for patients presenting with dental trauma injuries
- Indicate the clinical guidelines to be followed by Dental Therapists and Oral Hygienists when managing dental trauma injuries

2.2 Methods

A computer data base research method was implemented to collate information for this chapter. Information was gathered through applied literature research articles from Google Scholar, Science Direct, Web of Science, Scopus, EBSOhost and PubMed.

3. Prevalence of traumatic dental injuries

Trauma has been reported as a major disease burden in lower- and middle-income countries such as South Africa [5, 6]. TDI often occur in association with and contribute significantly to other bodily injuries. With more than one billion people having experienced TDI, these injuries are increasingly becoming of great dental public health concern because of the associated negative impact on economic

productivity and the quality of life of affected children and their families [5]. Children sustain 30% and 22% injuries to the primary and the permanent dentition, respectively [5]. It has been estimated that 50% of TDIs occur prior to children leaving school [5].

There is scarcity of data on the prevalence of TDIs in South Africa and Africa at large. A report indicated that there is a TDI prevalence of 16% in primary school children while another report indicated TDI prevalence of 6.4% in children aged 11–13 years old in South Africa [6, 7]. The prevalence of dental trauma varies from 6.1 to 62.1% in pre-school children and from 5.3 to 21% in schoolchildren [6, 7]. A recent review study which sought to estimate the global frequency and incident rates for TDI reported a prevalence of 15.2% and 22.7% in permanent and primary dentition, respectively [6]. Furthermore, the study reported a prevalence of 18.1% in 12-year-old children and an incidence rate of 2.82 per 100 person-years [7].

The variation in the prevalence of TDIs may be attributed to various factors including the study design, geographical location, different diagnostic criteria as determined by the trauma classification used, behavioral and cultural diversity [8].

Soft tissue injuries such as luxations and subluxations are more frequently seen in primary dentition while fractures of the crown involving enamel and dentine are seen more commonly in permanent dentition [8]. The most commonly injured teeth in primary mainly from falls in children and sport activities in adolescents.

The strongest association has been demonstrated between TDIs and gender as well as TDIs and age. Males experience TDIs more frequently than males with the ratio ranging from 1.3:1 to 2.5:1 [9, 10]. The ratio has however been decreasing over the years as more females participate in sport activities. TDIs are mainly sustained in young adults, preschool and school going children. Twenty five percent of school going children experience TDIs as a result of physical and behavioral factors [9–11].

4. Etiologic factors for traumatic dental injuries

There are many studies that have been conducted that provide the epidemiology of maxillofacial trauma throughout the world [12–15]. This is important as they provide etiological factors which vary, depending on the age of the patient in question, as well as cultural and socio-economic factors [12, 16].

Among the most common causes of the TDIs are: traffic accident involving motor vehicle, motorcycle, or bicycle; day-to-day activities and sports; as well as a fall from a height [17, 18]. Knowing the etiology of the maxillofacial trauma provides an understanding of people's behavior in a region and the need for adoption of preventive policies [12, 13, 16].

Traumatic dental and facial injuries are frequent in sports and often cause esthetic, functional, psychological, and economic problems [3–20]. Dental injuries are the most frequent orofacial injury related to participation in sports activities [19, 20].

The main causes of traumatic dental injuries are falls and collisions with people or objects, which are very common in contact sports [19, 20]. Participation in sports, especially contact sports, greatly increases the risk of traumatic dental injury.

5. Classification systems for dental trauma

Dental Therapists and Oral Hygienists need to be aware of how TDI are classified so that they can provide treatment for patients presenting with the conditions. Many classifications of TDI have been presented over the years [21].

The currently accepted system is based on the Application of International Classification of Diseases to dentistry and stomatology by the WHO (1995), and was modified by Andreasen and Andreasen (2011) [22–24].

The conditions to be observed in the two classifications include the following: crown infraction; uncomplicated and complicated crown fracture; uncomplicated and complicated crown-root fracture; root fracture; concussion; luxation; avulsion; and lacerations.

The modified Andreasen classification is more comprehensive and contains and explains more conditions to be observed when studying dental trauma. **Table 1** indicates the differences in the two classification systems and will prepare us to review and formulate a structure to guide dental professionals.

Based on the classification described in **Table 1** detailed descriptions of the injuries is provided. The injuries are categorized into soft tissue injuries (**Table 2**);

Andreasen and Andreasen (2011)	**World Health Organization (1995)**
Crown infraction, incomplete fracture of the enamel	Fracture of enamel of tooth
Uncomplicated crown fracture: a fracture confined to the enamel or dentine but not exposing the pulp	Fracture of crown without pulpal involvement
Complicated crown fracture: a fracture confined to the enamel and dentine and exposing the pulp	Fracture of crown with pulpal involvement
Uncomplicated crown-root fracture: a fracture involving enamel, dentine cementum, not exposing the pulp	Fracture of root of tooth
Complicated crown-root fracture: A fracture involving enamel, dentine, cementum and exposing the pulp	Fracture of crown and root of tooth
Root fracture: a fracture involving dentine, cementum, and the pulp	Fracture of tooth, unspecified
Concussion: injury without abnormal loosening or displacement but with marked reaction to percussion	Luxation of tooth
Subluxation (loosening): injury with abnormal loosening but without displacement of the tooth	Intrusion or extrusion of tooth
Intrusive luxation (central dislocation)	Avulsion of tooth
Extrusive luxation (peripheral dislocation, partial avulsion)	Other injuries including laceration of oral soft tissues
Lateral luxation	
Exarticulation (complete luxation)	
Comminution of alveolar socket	
Fractures of facial or lingual alveolar socket wall	
Fractures of alveolar process with and without involvement of the socket	
Fractures of the mandible or maxilla with and without involvement of the tooth socket	
Laceration of gingiva or oral mucosa	
Contusion of gingiva or oral mucosa	
Abrasion of gingiva or oral mucosa	

Table 1.
Andreasen and Andreasen (2011) and WHO classification (1995) of TDI.

Soft tissue injuries	Description	Management
Abrasion	Wound caused by superficial damage to the skin	Area to be cleansed through irrigating with saline solutions to remove irritants
Contusions	Hematoma of the tissue without a break in the surface	Often resolve on their own but ice or pressure dressing could decrease swelling
Lacerations	Any tear in the soft tissue (skin or mucosa)	Treatment varies but the area could be cleansed with copious saline irrigation to remove foreign debri
Soft tissue avulsions	An injury in which a structure is forcibly detached from its normal Point of insertion	Hemostatic control with direct pressure and alleviation of pain, followed by copious saline irrigation to help determine the severity of the injury

Table 2.
Summary describing common soft tissue injuries and their management (Patel et al.*, 2014).*

Dento-alveolar Injuries	Description	Management
Crown fracture	Injury on the coronal portion of the teeth affecting the enamel or dentin and/or the pulp	Depending on area, enamel does not need acute treatment, dentine involvement needs referral for a restoration by dental therapist or dentist
Crown-root fracture	Crown-root fractures involving the crown and root of the tooth, with or without involvement of the pulp	Restorations by dental therapist or dentist if the pulp is not involved and does not and extend far apically into the root. Root Canal Therapy or tooth extraction if there is pulpal involvement. Extraction delayed to allow healing of bony fracture.
Root fracture	Root fractures involving the root or roots of teeth. Radiographs could aid in diagnosis.	Root Canal Therapy, post and core, and crowns for fractures close to the crown; depending on the severity immobilization, extraction or apical fragment to be left in socket.
Tooth concussion	Teeth sensitive to touch or percussion and patient does not experience tooth mobility or displacement	Acute treatment not needed and relieve provided through occlusal contact relief of the sensitive tooth via enameloplasty on the opposing tooth
Tooth subluxation	Mobility on the tooth or looseness without tooth displacement	Extent of tooth mobility to determine treatment needed. Mild mobility can be treated as tooth concussion with occlusal contact relief and significantly mobile teeth may be splinted and immobilized by dental therapist or dentist.
Tooth displacement	Teeth could be displaced in any direction, but the most common displacement are in a buccal-lingual direction and mesiodistal direction. There is a possibility for intrusion or extrusion.	Depending on the extent of the displacement. Repositioning of the teeth could be provided along with splinting and immobilization for a minimum of 2 weeks depending on severity. Further management could include medication and referral to Maxillo-Facial and Oral Surgeons.

Dento-alveolar Injuries	Description	Management
Intrusion	Maxillary teeth often involved and if severe the teeth appear missing. The tooth is displaced into the socket.	Treatment could be controversial and management taken on a case by case basis.
Extrusion	The tooth is displaced out of the socket.	The displaced tooth could be pushed back into the appropriate position within their sockets, and could require splinting and immobilization. Depending on the severity Root Canal Therapy could be recommended.
Tooth Avulsion	Complete displacement of the tooth out from its alveolar socket.	Management varied and depends on extra-alveolar time, pulpal health and periodontal health.
Alveolar bone fracture	Injury to the alveolar process in the presence or absence of teeth.	Referral to Maxillo-Facial and Oral Surgeon for proper repositioning and stabilization. Splinting, copious irrigation and soft tissue suturing could be included in the treatment plan.

Table 3.
Summary describing common dento-alveolar injuries and their management (Patel et al., 2014).

Oro-facial bony injuries	Description	Management
Orbital Fracture	Involves fracture of the medial and lateral orbital walls, orbital roof and floor, and orbital rim. Clinical findings may include maxillary (midface) paresthesia, peri orbital edema, subconjunctival hemorrhage, diplopia, and impaired extraocular movements	Orbital fracture repair is usually indicated with enopthalmus greater than 2 mm, diplopia, floor defect greater than 1 cm, and ophthalmoplegia.
Nasal Fracture	Determined by physical examinations and clinical findings may include nasal edema, ecchymosis, epistaxis, septal deviation, mobility, crepitus, and nasal deformity.	Optimal within 1–2 days but waiting 7 to 10 days is recommended to allow for resolution of soft-tissue swelling.
Maxillary Fracture	Divided into LeFort I, II, and III, depending on the extent of the midfacial fractures.	Maxillary LeFort fractures often treated with open reduction and internal fixation. Maxillomandibular fixation (MMF) may be required for fracture reduction.
Mandibular Fracture	Occur in multiple locations based on injury type, force and direction of trauma.	Open or closed reduction.

Table 4.
Summary describing common oro-facial bony injuries and their management (Patel et al., 2014).

Dento-alveolar Injuries (**Table 3**); and Oro-Facial Bony Injuries (**Table 4**). The tables will also include the management to be provided for the TDIs as guidelines for dental professionals.

6. Discussion

The information compiled above shows that it is very crucial for Dental Therapists and Oral Hygienist to have a clear ability to formulate a diagnosis and oral hygiene care plan based on the assessment of the oral cavity [22–24]. Literature available tends to focus on TDI being diagnosed and managed by dentists and dental specialists [2, 3]. This is not always feasible as the first in line for the provision of oral health services are Dental Therapists and Oral Hygienists. The future of oral health services shows a need to empower all oral health professionals in the provision of TDI so that patients get optimal oral health services. With the number of auxiliary oral health professionals increasing, it is very important that their role in providing critical and emergency oral health services as emphasized.

Dental Therapist and Oral Hygienists provide treatment in a Primary Health Care setting and could therefore be the first in line to provide treatment when patients present in developing countries [6, 7, 9]. Hence it is crucial that they be provided with clear guidelines and information to diagnose and manage TDI. This will be done through the ability to classify the various TDI indicated in **Table 1**. The scope of practice for Dental Therapists and Oral Hygienists indicates that there should be a focus on dental trauma when clinical services are provided (**Tables 2–4**).

Table 5 provides a brief schematic template that indicates that during practice the Dental Therapists and Oral Hygienists should be able to identify whether patients present with soft tissue, dento-alveolar or oro-facial bony injuries when they provide dental treatment for adults and pediatric patients [25, 26]. This is

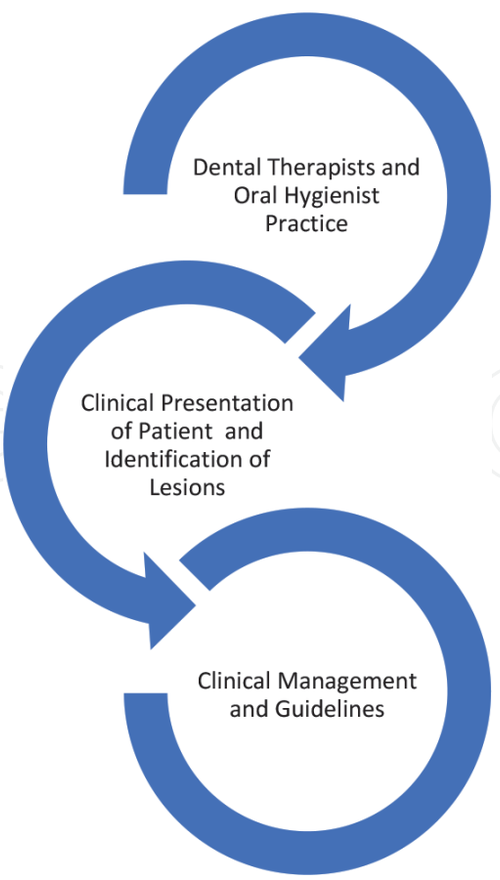

Table 5.
Applying the clinical findings in dental therapist and Oral hygiene practice.

important as they will be able to monitor the patient's progress towards achieving desired oral health outcomes.

When the patients present in the clinical environment there should be adequate clinical reasoning skills to know how to manage the TDI. The information provided in the middle column of **Tables 2–4** provides detailed descriptions of the TDI so that the Dental Therapists and Oral Hygienists can have clear guidelines of what to expect in practice. The middle circle of **Table 5** provides a relevant scheme to be followed that they should use to have a clear description of the possible lesions. This is essential for the provision of evidence of adequate consultation when needed and leads the clinicians to have adequate and clear written responses should the information be requested by other members of the dental team or health team [25–28]. This is a key factor to be considered as they also need to refer the lesions to the appropriate dental team members based on the scope of practice [27, 29, 30].

Clinical service and oral hygiene patient care is improved if the TDI are managed efficiently and effectively [31, 32].

The crucial step to be followed during all the phases is to ensure that there is appropriate documentation of self-care education, status of patient compliance, failed or canceled appointments, postoperative instructions provided, modification made in care plan and supportive facts, referrals and continued care schedule when the TDI are managed [4, 33].

The appropriate management will assist all clinicians to ensure that the individual patients' potential state of oral health and maintenance is achieved [33]. This leads to optimum oral health service that is crucial for the patients.

7. Conclusions

Ultimately, knowing how to effectively diagnose and start treating dental emergencies early will lead to better clinical outcomes and greater patient satisfaction. Availability of easily accessible dental emergency manual/guidelines provide an overview of effective management strategies for dental emergencies which is essential for Dental Therapists and Oral Hygienist [34].

It is very important to select appropriate clinical responses when patients present with dental trauma as discussed. [35, 36]. It is also crucial to note as discussed, that relevant approaches to diagnostic testing and evaluation when treating dental emergencies will build confidence and enable Dental Therapists and Oral Hygienists to effectively manage dental trauma.

A recommendation for developing protocols for the different categories of patients such as pediatric patients is suggested for further development. There is further room for a broader schematic template that shows how the inter and multidisciplinary team can play a role in providing oral health services for patients presenting with TDI.

Conflict of interest

The authors declare no conflict of interest.

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